Spotlight

Lab Automation & Informatics Systems

INFORMATICS IN THE BIOANALYTICAL AND CONTRACT RESEARCH MARKET

"Being at the forefront of innovation, PRA International has standardised on a LIMS solution for excellence in its bioanalytical laboratory."

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THE GLOBAL CRO MARKET

In today's life science market, with the strict regulatory framework and ever-increasing drug development costs, establishing strategic partnerships between pharmaceutical and biotechnology companies and CROs has emerged as a critical means to gain and sustain a competitive edge. CROs have become critical contributors to research and development (R&D), clinical trials and manufacturing activities, capable of delivering more volume studies quicker, cheaper and sometimes more efficiently than in-house laboratories. The leading CROs are full service providers operating globally and serving as one-stop-shops for activities, ranging from preclinical through to marketing.

In May 2007, Business Insights Ltd. published the study "The CRO Market Outlook: Emerging Markets, Leading Players and Future Trends". According to this report, the total CRO market size was estimated at $14bn in 2006 and projected to grow at an annual rate of 14-16% to reach $24bn by 2010. The market is highly fragmented and the total number of CROs worldwide has grown to over 1,100 despite continued consolidation. However, the five largest CROs have increased their market share considerably over the last few years and are estimated to hold 45% of the total market. A major factor that has contributed to the success of some of these large global CROs has been the implementation of market-specific, high-performance laboratory information management systems (LIMS).

THE VALUE OF LIMS WHEN OUTSOURCING

CROs need LIMS to help them gather, analyse and store analytical data on behalf of their pharmaceutical sponsors. Because data is delivered from the CRO to its sponsors, and ultimately to the US Food and Drug Administration (FDA), it is critical that shared reports are in the same format and in report formats following the standards laid down by the FDA. In that way, new drug entities can progress faster through the approval process, accelerating time-to-market. Speed of data capture and transmission is also of extreme importance. By speeding up data collection and thus data availability, CROs can contribute to a shortened drug development process and thereby increase their customers' productivity.

Compatibility of data between CRO and sponsor is important. When data reports are produced by CROs following the same format as the one implemented by their customers in-house, seamless communication and data transfer between the two partners is ensured. Pharmaceutical sponsors design their studies in the LIMS, the CRO opens the studies, fills in the data and sends the studies back to the sponsors.

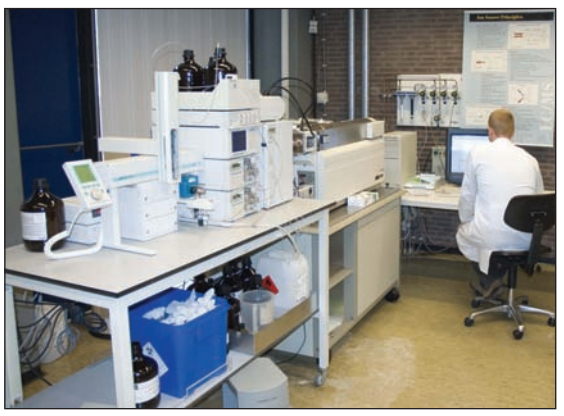
Being at the forefront of innovation, PRA International has standardised on a LIMS solution for excellence in its bioanalytical laboratory.

THE PRA BIOANALYTICAL LABORATORY

Headquartered in Raleigh, North Carolina, PRA International is one of the world's leading clinical development organisations delivering a broad array of services, from filing of Investigational New Drug (IND) to product registration and post-marketing studies.

The company's core services include drug development and regulatory strategy plans, Phase I clinical trials, Phase II through IV multi-center clinical trials, development and analysis of integrated global clinical databases, preparation and submission of regulatory filings in North America and Europe, long-term drug safety programs and late Phase (IV) programmes.

Key expertise areas are oncology, CNS, cardiovascular, respiratory and metabolic diseases. Since 1984, PRA International has conducted studies for almost every major pharmaceutical company in Europe, the United States and Japan while also providing supporting services including data management.



PRA International operates a state-of-the-art, GLP-compliant Bioanalytical Laboratory, located in Assen, the Netherlands, which provides pharmacokinetic/ pharmacodynamic analyses, including endogenous compounds and biomarkers.

Peter Ketelaar, Vice President of PRA International Bioanalytical Laboratory, explains: "We required a LIMS to integrate with and manage data from our facility's state-of-the-art analysers, including sixteen LC-MS, two UPLC and five HPLC systems."

The laboratory houses facilities for mass spectrometry (MS), high/ultra high performance liquid chromatography (HPLC), biochemistry and immunochemistry, genotyping, radio-isotope analysis and handling of biohazard samples. It has an excellent 24-year record in offering a range of bioanalytical services, including method development, implementation and validation and bioanalytical protocol design with over 2,400 studies executed.

Of the total number of studies, 70% are conducted using LC-MS and 20% using ELISA, RIA and IRMA analytical techniques for immunoassays, including automated immunoassays using the Immulite system and the Luminex system. The final 10% of revenues come from ADME and metabolic profile studies using radioactive compounds.

CLINICAL FIRST-IN-HUMAN STUDIES AND THE USE OF LIMS

One of the studies on which the Bioanalytical Laboratory focuses its efforts is Clinical First-in-Humans studies, i.e. studies that are being performed on humans for the first time.

In a typical bioanalytical study supporting a Clinical First-in-Humans study, data are obtained to elucidate the pharmacokinetic (PK) profile of a specific compound in the interest of future patients. It is of utmost importance that all PK data become available prior to a next dosing group. In order to fulfill this requirement, a fast and robust analytical method is needed, capable of providing an accurate report of the results from approximately 200 samples within 48 hours in a GLP compliant setting.

At the PRA International Bioanalytical Laboratory, LC-MS data are obtained using one of the sixteen API 3000, 4000 or 5000 systems and the Analyst 1.5.2 software. With Analyst peak area data are generated and imported into Thermo Scientific Watson LIMS™ where the concentration data are calculated using standards for each run and evaluated with QC samples.

For ELISA, spectrometric data from Softmax Pro are imported in Watson and further processed using the algorithms in the LIMS system to calculate the concentrations. Data are then evaluated with QC samples.

The reporting of the scientific results subjected to GLP compliance has become much easier and faster, since the implementation of LIMS has allowed scientists to produce reports that follow a consistent format across all types of techniques. As a result, true data consolidation across different studies and projects is facilitated. Study results are organised in a unique document management system for extra convenience and efficiency.

FACING CHALLENGES

Currently, the most important challenge facing bioanalytical laboratories is commoditisation of routine bioanalysis, with the most impacting consequence being a significant reduction of prices. As product lifecycles become increasingly shorter, many products quickly reach commodity status and price becomes the single biggest buying driver. Cost-efficiency, differentiation and innovation are the three most effective approaches that bioanalytical laboratories should follow to address the product commoditisation challenge.

Facilities are required to decrease costs and invest in innovative new equipment, in order to clearly differentiate their offering from that of their competitors and achieve a premium price for their products.

Investing in a state-of-the-art LIMS to manage the primary production process from sample receipt through to analytical report is thus imperative for bioanalytical laboratories. A powerful, fully integrated LIMS helps scientists manage their vast workload and provides a platform to support growth and achieve the ambitious objective for optimum operational excellence. Further immediate benefits include improvements in sample throughput, more efficient use of laboratory equipment and limited downtime for instruments.

Compliance with strict regulations is a further challenge facing bioanalytical laboratories. Most recently, regulations have been introduced requiring more information to be exported out of Phase I clinical trials in order to enable quicker killing of compounds (The Killing Fields Principle). This has resulted in a substantial growth of pharmacodynamic /biomarker assays in early phase development.

A competent LIMS solution is capable of meeting the bioanalytical laboratory's need for GLP and 21 CFR Part 11 compliance. Built-in security and audit trail capabilities provide maximum flexibility and configurability while preserving data integrity.

Peter Ketelaar comments: "In the highly competitive life science market, long term profitability and survival depend largely on staying current by following industry trends. Contract research organisations need to closely match what big pharmaceutical companies do. Thermo Scientific Watson LIMS is the industry-standard LIMS, used by 18 out of the 20 largest global pharmaceutical companies and 19 out of the 20 leading biotechnology and contract research organisations worldwide.

The solution's market universality played a crucial role in its selection for our Bioanalytical Laboratory. Our scientists can now produce reports that follow the exact same format as the one implemented by our customers in-house. Communication and data transfer between PRA International and our pharmaceutical sponsors is totally seamless."

REAPING THE BENEFITS

The Bioanalytical Laboratory operates within GLP/OECD compliant protocols and processes more than 150,000 samples per year. The facility manages the entire process, from performing the trials and analysing the samples to managing the data for the company's pharmaceutical sponsors. The decision to invest in a new state-of-the-art LIMS to manage the primary production process from sample receipt through to analytical report was imperative for the Bioanalytical Laboratory.

Since its implementation, Watson LIMS has been able to bring to the Bioanalytical Laboratory a set of flexible reporting tools, which allow scientists to produce reports that follow the exact same format as the one implemented by their customers in-house. Communication and data transfer between PRA International and its pharmaceutical sponsors is totally seamless, sample turnaround is accelerated, costs associated with sample management are reduced and operational efficiency is improved. Peter Ketelaar comments "The LIMS will help us to run the primary process of sample analysis more efficiently; from sample receipt up to reporting the data to the sponsor, including faster and more reliable quality control. Both internal & external communication and coordination will run smoother."

Watson LIMS has also been able to help meet the laboratory's need for GLP and 21 CFR Part 11 compliance. Peter Ketelaar comments: "As part of our ambitious plan to implement technological innovations that promote operational excellence and regulatory compliance, PRA International always selects the best in breed products. That is why we have standardized on an industry-standard LIMS in our world-class Bioanalytical Laboratory."

High Throughput PCR Plate Preparation

Velocity11 has released a new technical note describing an automated Polymerise Chain Reaction (PCR) workstation based upon a combination of their Bravo™ liquid handler, BenchCel® plate handling system, PlateLoc® thermal microplate sealer and a bulk reagent dispenser. The automated workstation is shown to provide a reliable, efficient solution for processing plates in batches or one at a time through the necessary stages of PCR plate preparation. Using the described protocol up to 50 diluted replicate plates with Master Mix and Exon additions can be run without user intervention. The typical throughput for the described set-up was found to be about 5 hours for 50 plates, depending on exact protocol and liquid handling steps. Up to 2 additional BenchCel systems can be integrated to the Bravo liquid handler to further increase capacity. The on-deck accessories for the Bravo liquid handler are shown to provide the temperature control and sonicating wash to decontaminate tips that are necessary capabilities for working with DNA and other sensitive materials. Velocity 11's powerful, yet highly intuitive VWorks automation control software was used to provide a single, simple user interface to control all critical task parameters. The combination of Velocity11's Bravo™ liquid handler, BenchCel® plate handling system, PlateLoc® thermal microplate sealer and a bulk reagent dispenser is shown to allow users to run the PCR preparation with high throughput and maximum walk-away time.

Circle no. 63

Video Demonstrates Automatic Microplate Sealing and Stacking System

Porvair Sciences Ltd, has produced a new online video that demonstrates how its TriSeal High Throughput Sealing Station provides busy laboratories with a compact, easy-to-use solution for automated microplate sealing and stacking. Accessed from www.porvair-sciences.com the .wmv format streaming video demonstrates how, with one simple command, the TriSeal High Throughput Sealing Station can be instructed to securely seal and store up to 100 microplates. Featuring the tried and tested Scorpion™ stacker/loader, the video shows how the TriSeal High Throughput Sealing Station uses a single Scorpion to both load and unload the TriSeal™. As the first plate is sealed inside the TriSeal, a second plate is automatically added to the turntable prior to the ejected sealed plate being removed by the Scorpion and returned to the 'sealed' stack. A single interface box is used to control the stacker/loader and the TriSeal.

Combining the flexibility of a 3-position turntable with the unparalleled convenience of unattended microplate loading and unloading the TriSeal High Throughput Sealing Station is shown to offer significant productivity and throughput benefits to the busy screening or compound management laboratory. The TriSeal High Throughput Sealing Station is able to produce an accurate and tight seal on any SBS proposed standard microplate from 5 to 47mm in height. Offering adjustable temperature heat sealing from 50ºC up to 185ºC the station is able to operate optimally with most foil and film seals.

Circle no. 64